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October 4, 2004

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Subject: Residential Risk Screening for Area of Concern 1 (AOC 1), Air Force Plant 42,  
Palmdale, California

This letter transmits an addendum to the *Final Site Closure Report for Area of Concern 1, Air Force Plant 42, Palmdale, California*, dated January 2003. These supplemental materials describe the results of the residential risk screening performed for AOC 1.

Please provide comments on the enclosed materials by November 1, 2004. If you have any questions regarding the enclosed materials, please contact me at 714/435-6361.

Sincerely,

CH2MHILL

Tim Smith  
Project Manager

Enclosure

SCO\ Addendum 1: Residential Risk Screening for Area of Concern 1, Air Force Plant 42

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**United States Air Force  
Installation Restoration Program**

**Final  
Site Closure Report for Area of Concern 1  
Air Force Plant 42  
Palmdale, California**

**January 2003  
(Amended October 2004)**

**Delivery Orders 095 and 170 – Contract F41624-97-D-8019  
Task Order 030 – Contract F41624-03-D-8595**

**Prepared for:**

**Restoration Branch, Acquisition Environmental  
Safety and Health Division (ASC/ENVR)  
Aeronautical Systems Center  
Wright-Patterson Air Force Base, Ohio**

**and**

**Air Force Center for Environmental Excellence (AFCEE)  
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**Prepared by:**



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# Addendum 1: Residential Risk Screening for Area of Concern 1, Air Force Plant 42

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**Document:** Final Site Closure Report for Area of Concern 1, Air Force Plant 42, Palmdale, California. Prepared by CH2M HILL.

**Prepared for:** Restoration Branch, Acquisition Environmental Safety and Health Division (ASC/ENVR), Aeronautical Systems Center, Wright-Patterson AFB, Ohio

Air Force Center for Environmental Excellence (AFCEE)  
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**Prepared by:** CH2M HILL

**Project:** Task Order 030 – Contract F41624-03-D-8595

**Date:** October 4, 2004

## Introduction

In the January 2003 version of the *Final Site Closure Report for Area of Concern (AOC) 1, Air Force Plant (AFP) 42, Palmdale, California* (CH2M HILL, 2003), a risk screening was performed using the United States Environment Protection Agency (EPA) Region IX Industrial Preliminary Remediation Goals (PRGs). The industrial exposure scenario is considered appropriate for AFP 42 because the current and anticipated future land use is industrial. The Industrial PRG risk screening results indicate that no unacceptable risks to industrial workers exist at AOC 1.

Although the land use at AFP 42 is anticipated to remain industrial, the Department of Toxic Substances Control (DTSC) requires institutional controls (ICs) at sites solely evaluated for industrial use to prevent unauthorized and potentially inappropriate land development or land use (e.g., residential land use). To achieve unrestricted land use for AOC 1 and, thereby, avoid the need for ICs, the Air Force has elected to perform a supplemental risk screening for the site using the EPA PRGs for a residential exposure scenario. The purpose of this addendum is to document the residential risk screening for AOC 1.

## Residential Risk Screening Methodology

A residential risk screening was performed using the soil data collected during the 2001 and 2002 removal actions at AOC 1. Soil data were compared to the EPA Region IX Residential PRGs (U.S. EPA, 2002). The methodology used for the residential risk screening is the same as presented in the 2003 AOC 1 closure report, and is briefly described below.

To assess the potential residual human health risks at AOC 1, a cumulative risk evaluation of the confirmation sample results was performed using EPA's stepwise approach. Using the stepwise approach, carcinogenic and noncarcinogenic compounds are evaluated separately. For carcinogenic risk estimates, the ratio of the detected concentration to the carcinogenic PRG is calculated for each chemical. The ratio is then multiplied by  $10^{-6}$  to estimate chemical-specific risk for a reasonable maximum exposure. The risks for all chemicals are then summed. For noncarcinogenic risks, the ratio of each detected concentration to the noncancer PRG is calculated, and the risks for all chemicals are summed. A carcinogenic risk value less than  $1 \times 10^{-6}$  and a noncarcinogenic risk value of less than 1 are generally considered acceptable. Some chemicals (e.g., arsenic) are capable of both carcinogenic and noncarcinogenic responses; therefore, such chemicals are evaluated for both carcinogenic and systemic (noncarcinogenic) effects.

Residential PRG values have not been established for all of the dioxin compounds detected in the AOC 1 samples. For those compounds without PRG values, target cleanup goals were calculated based on toxicity equivalency factors for 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD) (World Health Organization, 1998).

In addition to using residential PRGs, concentrations of metals detected in the confirmation samples are screened using background levels established for AFP 42. The method for calculating these values is presented in the *Final Remedial Investigation Report for the Operable Units 1, 2, 3, 4, and 5* (CH2M HILL, 2004).

## Risk Screening Results

Summaries of the residential risk screening results are shown in Tables 1 and 2. Two sets of risk screening calculations are presented: potential risks including all detected parameters (Table 1), and potential risks excluding metals concentrations less than AFP 42 background concentrations (Table 2).

The potential noncarcinogenic risks for the residential scenario at AOC 1 are less than the hazard index threshold of 1 (Table 1). The total potential carcinogenic risk value for the residential exposure scenario ( $2.0 \times 10^{-5}$ ) exceeds the  $1 \times 10^{-6}$  risk threshold (Table 1). Approximately 98 percent of the carcinogenic risk value is due to arsenic, detected at a maximum concentration of 7.7 mg/kg. The PRG value for arsenic (0.39 mg/kg) is less than the AFP 42 background concentration (9.0 mg/kg). When arsenic concentrations less than the AFP 42 background concentration are removed (Table 2), the potential cancer risk for the residential scenario ( $4.2 \times 10^{-7}$ ) is less than the  $1 \times 10^{-6}$  risk threshold generally considered acceptable by regulatory agencies.

## Conclusions and Recommendations

Based on the risk screening results, no unacceptable human health risks to potential future residential receptors exist at AOC 1. Therefore, AOC 1 is recommended for no further action and unlimited land use.

## References

CH2M HILL, 2003. *Final Site Closure Report for Area of Concern 1, Air Force Plant 42, Palmdale, California*. January 2003.

\_\_\_\_\_, 2004. *Final Remedial Investigation Report for Operable Units 1, 2, 3, 4, and 5, Air Force Plant 42, Palmdale California*. Amended March 2004.

U.S. Environmental Protection Agency. 2002. *Region IX. Preliminary Remediation Goals (PRGs) Update for 2002*. October 2002.

World Health Organization, 1998. Toxicity equivalency factors were calculated in accordance with Vanden Berg, M. et al., *Environmental Health Perspectives*, Vol. 106. 1998.

**Table 1**  
**Cumulative Residential Risk Screening Calculations**  
**for Areas of Burned Rubber - All Detected Parameters**  
**AOG 1, Air Force Plant 42**

Parameter	Sample ID	Sample Type	Concentration (mg/kg)	EPA PRGs - Residential (mg/kg)	Risk Ratio
<b>CARCINOGENIC PARAMETERS</b>					
Arsenic	ACSFC1001	N	7.7	0.39	2.0E-05
1,2,3,4,6,7,8-HpCDD	ACSFC2001	N	0.0000011 B	0.00039	2.8E-09
1,2,3,4,6,7,8-HpCDF	ACSFC1002	N	0.0000014 F	0.00039	3.6E-09
1,2,3,4,6,7,8,9-OCDD	ACSFC4001	N	0.0000077 B	0.039	2.0E-10
1,2,3,4,6,7,8,9-OCDF	ACSFC1002	N	0.0000115	0.039	2.9E-10
1,2,3,4,7,8-HxCDD	ACSFC6001	N	0.00000053 M	0.000039	1.4E-08
1,2,3,4,7,8-HxCDF	ACSFC6001	N	0.00000063 B	0.000039	1.6E-08
1,2,3,4,7,8,9-HpCDF	ACSFC6001	N	0.0000005 M	0.00039	1.3E-09
1,2,3,6,7,8-HxCDD	ACSFC6001	N	0.00000058 M	0.000039	1.5E-08
1,2,3,6,7,8-HxCDF	ACSFC6001	N	0.00000054 B	0.000039	1.4E-08
1,2,3,7,8-PCDD	ACSFC6001	N	0.00000044 M	0.0000039	1.1E-07
1,2,3,7,8-PCDF	ACSFC6001	N	0.00000051 F	0.000078	6.5E-09
1,2,3,7,8,9-HxCDD	ACSFC6001	N	0.00000063 F	0.000039	1.6E-08
1,2,3,7,8,9-HxCDF	ACSFC6001	N	0.00000079 F	0.000039	2.0E-08
2,3,4,6,7,8-HxCDF	ACSFC6001	N	0.00000058 F	0.000039	1.5E-08
2,3,4,7,8-PCDF	ACSFC6001	N	0.00000044 M	0.0000078	5.6E-08
2,3,7,8-TCDD	ACSFC3003	N	0.00000046 F	0.0000039	1.2E-07
2,3,7,8-TCDF	ACSFC1002	N	0.00000019 M	0.000039	4.9E-09
<b>Total Potential Cumulative Carcinogenic Risk:</b>					<b>2.0E-05</b>
<b>NONCARCINOGENIC PARAMETERS</b>					
Arsenic	ACSFC1001	N	7.7	22 nc	3.5E-01
<b>Total Potential Cumulative Noncarcinogenic Risk (Hazard Ratio):</b>					<b>0.35</b>

**Notes:**

Calculations were prepared according to the EPA's stepwise approach for PRG screening of sites with multiple pollutants (EPA, 2000).

Maximum concentrations were used to determine residual risks.

N - normal

FD - field duplicate

B - The analyte was found in an associated blank, as well as, in the sample.

F - The analyte was positively identified, but the associated numerical value is below the reporting limit.

M - A matrix effect was present.

mg/kg - milligrams per kilogram

\*PRG values presented are for the following surrogate compounds:

nc - noncarcinogenic value

EPA - U.S. Environmental Protection Agency, Region IX

PRG - Preliminary Remediation Goal

HpCDD - heptachlorodibenzo-p-dioxin

HpCDF - heptachlorodibenzofuran

HxCDD - hexachlorodibenzo-p-dioxin

HxCDF - hexachlorodibenzofuran

OCDD - octachlorodibenzo-p-dioxin

OCDF - octachlorodibenzofuran

PCDD - pentachlorodibenzo-p-dioxin

PCDF - pentachlorodibenzofuran

**Table 2**  
**Cumulative Residential Risk Screening Calculations**  
**for Areas of Burned Rubber - Screened for Background Metals**  
**AOC 1, Air Force Plant 42**

Parameter	Sample ID	Sample Type	Concentration (mg/kg)	EPA PRGs - Residential (mg/kg)	Risk Ratio
<b>CARCINOGENIC PARAMETERS</b>					
1,2,3,4,6,7,8-HpCDD	ACSFC2001	N	1E-06 B	0.00039	2.8E-09
1,2,3,4,6,7,8-HpCDF	ACSFC1002	N	1E-06 F	0.00039	3.6E-09
1,2,3,4,6,7,8,9-OCDD	ACSFC4001	N	8E-06 B	0.039	2.0E-10
1,2,3,4,6,7,8,9-OCDF	ACSFC1002	N	1E-05	0.039	2.9E-10
1,2,3,4,7,8-HxCDD	ACSFC6001	N	5E-07 M	0.000039	1.4E-08
1,2,3,4,7,8-HxCDF	ACSFC6001	N	6E-07 B	0.000039	1.6E-08
1,2,3,4,7,8,9-HpCDF	ACSFC6001	N	5E-07 M	0.00039	1.3E-09
1,2,3,6,7,8-HxCDD	ACSFC6001	N	6E-07 M	0.000039	1.5E-08
1,2,3,6,7,8-HxCDF	ACSFC6001	N	5E-07 B	0.000039	1.4E-08
1,2,3,7,8-PCDD	ACSFC6001	N	4E-07 M	0.000039	1.1E-07
1,2,3,7,8-PCDF	ACSFC6001	N	5E-07 F	0.000078	6.5E-09
1,2,3,7,8,9-HxCDD	ACSFC6001	N	6E-07 F	0.000039	1.6E-08
1,2,3,7,8,9-HxCDF	ACSFC6001	N	8E-07 F	0.000039	2.0E-08
2,3,4,6,7,8-HxCDF	ACSFC6001	N	6E-07 F	0.000039	1.5E-08
2,3,4,7,8-PCDF	ACSFC6001	N	4E-07 M	0.000078	5.6E-08
2,3,7,8-TCDD	ACSFC3003	N	5E-07 F	0.000039	1.2E-07
2,3,7,8-TCDF	ACSFC1002	N	2E-07 M	0.000039	4.9E-09
<b>Total Potential Cumulative Carcinogenic Risk:</b>					<b>4.2E-07</b>
<b>NONCARCINOGENIC PARAMETERS</b>					
After screening out metals below background, there are no noncarcinogenic parameters.					
<b>Total Potential Cumulative Noncarcinogenic Risk (Hazard Ratio):</b>					<b>0.00</b>

**Notes:**

Calculations were prepared according to the EPA's stepwise approach for PRG screening of sites with multiple pollutants (EPA, 2000).

Maximum concentrations were used to determine residual risks.

Metal concentrations detected below background levels established at Operable Units 1, 2, 3, 4, and 5 of AFP 42 were not included in this risk evaluation.

N - normal

FD - field duplicate

B - The analyte was found in an associated blank, as well as, in the sample.

F - The analyte was positively identified, but the associated numerical value is below the reporting limit.

M - A matrix effect was present.

\*PRG values presented are for the following surrogate compounds:

mg/kg - milligrams per kilogram

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HpCDD - heptachlorodibenzo-p-dioxin

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OCDD - octachlorodibenzo-p-dioxin

OCDF - octachlorodibenzofuran

PCDD - pentachlorodibenzo-p-dioxin

PCDF - pentachlorodibenzofuran

TCDD - tetrachlorodibenzo-p-dioxin